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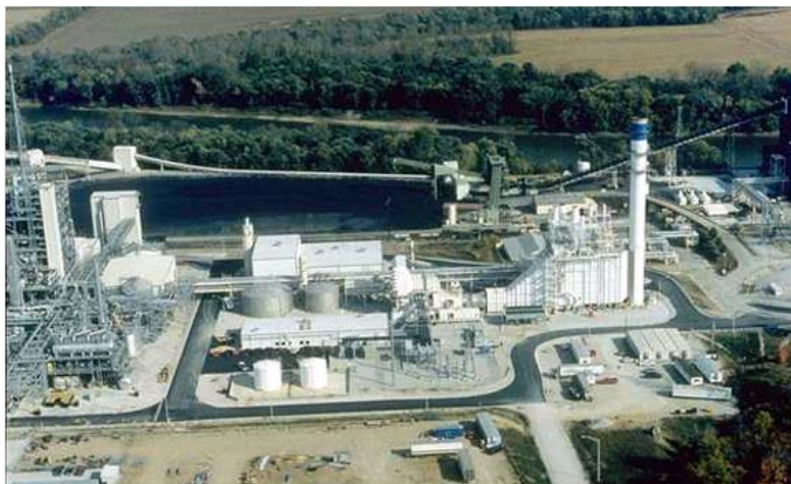


STATUS OF GASIFICATION TECHNOLOGY

Description

For many years, the Department of Energy (DOE) and industry have worked to develop the concept of integrating coal gasification with clean, efficient gas and steam turbines to create Integrated Gasification Combined Cycle (IGCC) power plants. This development program has been sparked by the need for more efficient power generation with the advantage of lowest possible emissions. In the United States, IGCC technologies are now being demonstrated, for power applications, as part of the DOE's Clean Coal Technology (CCT) Demonstration Program. The significant strides in this program together with those from plants operating in the Netherlands and Spain have made IGCC the technology of choice for future coal-based power generation facilities.

For applications to broader needs, gasification technologies are capable of processing any carbon-based feedstock to produce synthesis gas for the production of electricity, steam, hydrogen, transportation fuels, and chemical. Gasification has become widely accepted on a worldwide basis, is used extensively and is expected to grow ever more rapidly with future applications. Coal and petroleum residuals are by far the dominant feedstocks, together accounting for over 70% of the synthesis gas capacity. Natural gas is also an important feedstock for synthesis gas production and has been the traditionally abundant resource for synthesis gas and is used almost exclusively in the production of chemicals. Over the next several years, most of the growth in world wide synthesis gas capacity will be from the gasification of coal and petroleum residuals. The growth in these feedstocks, however, will be used primarily to produce electricity, with the use of synthesis gas for the production of electricity approaching that of chemicals.



Wabash River Coal Gasification Project

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While most of the attention has been focused on the advanced power generation applications, many industrial applications have recently evolved, focusing on resource utilization and product flexibility. Today, gasification is widely deployed throughout the world in many industrial settings. Currently, there exists 128 plants worldwide with 366 operating gasifiers. The vast majority of these facilities are located in Western Europe, the Pacific Rim, Africa, and North America. Combined, these plants generate over 42,000 MWth of synthesis gas. During the next 5 years, an additional 33 plants with 48 gasifiers are expected to be constructed adding another 18,000 MWth of synthesis gas capacity. Most of this expected growth will occur in the developing nations in the Pacific Rim as the need for further electrification of these nations' economies grow. The second largest growth area is expected to be in Western Europe where refineries will need to fully utilize the available feedstock while reducing fuel oil production. Growth in North America will be about half of that in Europe and will be concentrated in the refining industry. Very little or no growth is anticipated to occur in Africa or other regions of the world.

Goals

More intense competition resulting from deregulation of the power industry, stricter environmental laws on the emissions of sulfur and nitrogen oxides, hazardous air pollutants, and particulates, tighter regulations on product end-use applications, and the potential for future worldwide greenhouse gas emission treaties will have significant consequences on industry and society alike. To be competitive in such an environment and be the technology of choice, gasification technologies for power (IGCC) must have thermal efficiencies greater than 60%, have capital cost less than \$1,000/kWe; emit very little or no sulfur or nitrogen oxides, hazardous air pollutants, and fine particulates; utilize a variety of carbon-based feedstocks; produce a wide assortment of commodity and specialty products to meet any market application; and capture and sequester carbon dioxide. Of all advanced technologies currently under development, gasification-based technologies are the only ones that have potential to achieve all of these ambitious goals simultaneously. The DOE's Gasification Technologies program and its newly unveiled Vision 21 program seek to achieve these performance goals at product costs that are equal or lower than that in today's market.



Tampa at Night